Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14CE2029** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ADVANCED REINFORCED CONCRETE STRUCTURES** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Describe the assumptions adopted in the flat slab system by Equivalent frame method. | CO1 | 8 |
| b. | Design the exterior panel of a flat slab of size 5 m x5 m with suitable drop to support a live load of 4 kN/m2. The floor system is supported by columns of size 400 mm diameter. Floor height is 3.2 m. Use M20 concrete and Fe 415 steel.  Sketch the reinforcement diagram for the slab system. | CO2 | 12 |
| (OR) | | | | |
| 2. | a. | Enlist the advantages and disadvantages of flat slab over the rectangular slab. | CO1 | 8 |
| b. | Design an interior panel of a flat slab of size 5m x 5m with suitable drop to support a live load of 5kN/m2 . The floor system is supported by columns of size 500 x 500 mm. Floor to floor distance is 3.6m. Use M20 concrete and Fe 415steel. | CO2 | 12 |
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| 3. | a. | Design the deck slab of a T-beam girder bridge to suit the following data:Clear roadway =7.5m. Assume three T-beams spaced at 2.5m intervals. Effective span of T-beam =18m. M20 grade of concrete and Fe 415 HYSD bars. Sketch the reinforcement diagram. | CO2 | 20 |
| (OR) | | | | |
| 4. | a. | Design a simply supported RC slab required for the deck of a road bridge having the following data:  Clear width of roadway = 6 m  Foot paths = 1m on either side  Clear span = 5 m  Width of bearing = 400mm  Thickness of wearing coat = 80mm  Type of loading : IRC class A  Materials: M30 grade of concrete, Fe 415 grade HYSD bars  Sketch the reinforcement diagram. | CO2 | 20 |
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| 5. | a. | Describe the application of deep beams with neat sketch. | CO1 | 5 |
|  | b. | Design a corbel to support a gantry girder reaction of 400kN at service condition acting at a distance of 225mm from the face of a 400 x400 mm column. The concrete mix of grade M25 and HYSD steel of grade Fe415 are used for construction. | CO2 | 15 |
| (OR) | | | | |
| 6. | a. | Explain the force transfer mechanism in corbel. | CO1 | 5 |
|  | b. | Design an interior span of a beam 500mm wide and 6 m deep simply supported over a clear span of 10m. The beam carries a UDL of 180kN/m at the service state and is supported on wall of 500mm thick on each end. Use M20 & Fe415 steel, assume the ends are simply supported. | CO3 | 15 |
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| 7. | a. | Examine the arch and tie action in deep beams. | CO1 | 5 |
|  | b. | Design a continuous beam of width 500mm and 3.5m deep over a clear span of 6.5m. The beam rests on support of 0.8m and carries a load of 350kN/m including its self weight. Use M20 concrete and Fe 415 steel. Sketch the reinforcement diagram of the deep beam. | CO3 | 15 |
| (OR) | | | | |
| 8. | a. | Differentiate between ‘Deep Beams’ and ‘Simple Beams’. | CO1 | 5 |
|  | b. | A RC grid floor is to be designed to cover a floor area of 15 m x 15 m. The spacing of ribs in mutually perpendicular direction is 1.5 m c/c. Liveload on floor is 3 kN/m2. Adopt M20 and Fe 415. Analyze and design the grid floor using Rankine Grashoff method.  Sketch the reinforcement details. | CO2 | 15 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Design a spherical dome for a circular room of 12 m diameter with 230mm thick wall. Assume the incidental live load and finishes on the dome as 9 kN/m2 and 1 kN/m2. Use M20 concrete and Fe-415 steel. Sketch the reinforcement diagram. | CO2 | 20 |